

378/239. BIOACCESSIBILITY OF BETA-CAROTENE LOADED OLEOGELS

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Introduction

Oleogels are able to provide a healthier alternative for saturated fat replacement in foods, while providing tailor-made nutritional, structural and textural properties. Despite the great number of works on the development and characterization of this kind of systems using different materials, their performance as carriers of bioactive compounds, and their behavior under gastrointestinal conditions has been scarcely studied.

Objective

In vitro study of the bioaccessibility of beta-carotene loaded in two distinct edible oleogels prepared through single- (beeswax) or multi-component (sterol mixture) gelation.

Methodology

High Oleic Sunflower Oil (HOSO) was structured with 8% (w/w) of gelator (beeswax or a mixture of gamma-oryzanol and beta-sitosterol (60:40 ratio)). Both oleogels were loaded with 0.1% (w/w) of beta-carotene. In vitro digestion of oleogels was performed in three stages (mouth, stomach and small intestine) following the INFOGEST standard protocol. A visual inspection of the digested oleogels and fluorescence microscopy were performed. The amount of beta-carotene was quantified by HPLC. The cytotoxicity of digested oleogels was evaluated by monitoring transepithelial electrical resistance (TEER) of Caco-2 + HT-29-MTX monolayers, up to 4h of contact.

Main findings

Oleogels were evaluated in terms of their textural properties and the results showed that sterol-based oleogels have an average hardness approximately 4-fold higher than beeswax oleogels. In vitro digestion demonstrated that both oleogels showed structural disintegration after the gastric and intestinal phase. The bioaccessibility of beta-carotene was low, however the amount of bulk lipid could be adjusted, in order to improve the bioaccessibility. No cytotoxicity was detected along the experiment.

Conclusion

This study demonstrates that the INFOGEST standard protocol is suitable for the evaluation of in-vitro digestion of oleogels. The acquired bioaccessibility of beta-carotene in the tested formulations was found to be low. It was demonstrated that oleogels might have potential on the development of functional foods.

Key words

Beta-carotene, bioaccessibility, bioactive, digestion, oleogel